

Real-time range control for tours with the e-bike - arrive safely without physical overexertion

Innovative software tool/onboard computer for e-bikes to check the feasibility of a desired route on the basis of adjustable personal factors and the use of real-time route parameters with a given battery capacity and then to be able to master it safely and with appropriate physical effort. The assistance power of the electric motor is continuously and proactively checked and automatically (re-)regulated over the entire course of the route, taking into account the battery charge.

- Individual, optimised route planning and guidance
- Continuous and proactive checking and automatic (re-)regulation of the assistance power of the electric motor
- Consideration of current route parameters in real time and of your own fitness level
- Uniform, non-overloading effort for the rider
- Optimal utilisation of the battery charge
- Safe achievement of destination, especially for range-critical journeys
- Can be retrofitted to existing e-bikes

Fields of application

Innovative software tool/onboard computer for route planning and optimal route guidance when riding an e-bike. Arrive safely without physical overexertion.



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Service

The Technologie-Lizenz-Büro GmbH is in charge of the exploitation of this technology and offers companies the opportunity to cooperate and/or obtaining a license.

Background

According to figures from the Zweirad-Industrie-Verband (ZIV) Germany from March 2020 and August 2021, sales of e-bikes in Germany have been rising steadily for years, particularly markedly in the years since 2017. In 2020, approximately 1.95 million e-bikes were produced in Germany. In 2019, there was already a total stock of 5.4 million e-bikes. According to the trade association LEVA-EU, over 3 million e-bikes were sold in Europe in 2019. Despite production and supply chain issues, e-bike production increased in H1 2021. The demand for e-bikes is unbroken and is expected to remain strong, also due to modern mobility concepts.

Problem

Until now, the rider of an e-bike has had to assess route planning and routing on the basis of simple range predictions and, if necessary, their own personal experience. Concrete, current route parameters have not yet been taken into account and the rider can only estimate the required physical effort and support power of the electric motor. This means that, at least for range-critical journeys, there remains an uncertainty that the battery capacity may not be sufficient for the desired destination or that the driver may incorrectly estimate the required battery charge and then have to complete the route unnecessarily with too much physical effort.

Solution

The innovative software tool/onboard computer first checks the intended route, taking into account the desired physical exertion of the driver and using the current route parameters. The driver can also specify a safety reserve for the battery capacity that is not to be used during the check and route guidance. In addition to the course and altitude profile of the route, the route parameters also include the condition of the route surface, time of day, weather conditions, etc., which are currently retrieved from databases (web APIs). The rider can enter weight, age and fitness level and select a riding mode, e.g. comfort, rather sporty, athletic or similar. The rider's physical exertion is determined by cadence, pedalling torque, pulse and/or breathing rate. The innovative software tool/onboard computer then controls the routing in such a way that the route can be travelled with optimal support from the electric motor, so that a steady, non-overloading physical effort is made with extensive but not excessive utilisation of the battery charge.

Existing e-bikes can also be retrofitted. The only prerequisite is the existence of an interface, e.g. Bluetooth, so that the smartphone can be used for data generation and, if necessary, optimisation. Such an interface is already available in some cases or can be attached to existing e-bikes via a corresponding adapter without much installation effort.